REMARKS

Claims 1-48 are pending. Claims 1, 15, 24, 32, 43, 45 and 48 are independent. Claims 1 and 48 have been amended. Support for the amendments may be found throughout the Specification, for example, at page 11, line 28 to page 12, line 4. No new matter has been added.

Rejections under 35 U.S.C. § 103

Claims 1-31 and 48

Claims 1-31 and 48 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent Publication 2002/0006153 to Ranson *et al.* ("Ranson") in view of U.S. Patent No. 6,322,901 to Bawendi *et al.* and U.S. Patent 5,986,272 to Britton, Jr. *et al.* See page 2 of the Advisory Action dated September 11, 2003. Claims 1, 15, 24 and 48 are independent.

Independent claims 1 and 48 and the claims that depend therefrom

Applicants have discovered a method of sensing temperature including detecting an emission intensity of light from a sensor and determining the temperature of a surface of a substrate directly from the emission intensity of light from the sensor. See independent claims 1 and 48.

The Examiner has indicated that Ranson does not determine the temperature of the surface directly from the emission intensity of light from a sensor. *See* Advisory Action of February 23, 2004 at page 2. Claims 1 and 48 have been amended to indicate that Applicant's discovery includes determining the temperature of a surface directly from the emission intensity of light from a sensor.

Bawendi and Britton do not cure this deficiency of Ranson, alone or in combination. Neither Bawendi nor Britton, alone or in combination teaches or suggests determining the temperature of a surface directly from the emission intensity of light from a sensor. Indeed, Bawendi discusses how to prepare and manipulate semiconductor nanocrystals. See Bawendi at Abstract. Like Ranson, Britton discloses determination of decay time constants of fluorescing phosphors and using the decay time constants to determine temperatures. See Britton at column

2, lines 12-18. Thus, Ranson combined with Bawendi and Britton does not render claims 1 and 48 obvious.

For at least these reasons claims 1 and 48 and the claims dependent therefrom are patentable over Ranson, Bawendi and Britton and combinations thereof. Applicants respectfully request reconsideration and withdrawal of this objection.

Independent Claims 15 and 24 and claims dependent therefrom

Applicants have also discovered a temperature sensor and a temperature sensing coating including a matrix containing a semiconductor nanocrystal, the matrix formed from a semiconductor nanocrystal and a binder. See independent claims 15 and 24.

The Examiner appears to reject these claims based on the incorrect belief that Bawendi teaches semiconductor nanocrystals in a binder, and that the combination of Bawendi with Ranson and Britton thus teach or suggest the claims. Applicants respectfully disagree. The Examiner asserts that the specification on page 7, line 30 to page 8, line 12 describes that:

> the surface of the nanocrystal has an overlayer formed by a coordinating group bonding to the surface of the nanocrystal, wherein a compound such as a polymer attaches to the overlayer, the polymer having a moiety that attaches with the dispersion medium, and the overlayer can react with another compound to bond the nanocrystal to "the binder", i.e. the dispersion medium.

See Advisory Action of February 23, 2004 at page 2. Applicants respectfully disagree. The Specification states at these lines:

> The outer surface of the nanocrystal can include layer of compounds derived from the coordinating solvent used during the growth process. The surface can be modified by repeated exposure to an excess of a competing coordinating group to form an overlayer. For example, a dispersion of the capped nanocrystal can be treated with a coordinating organic compound, such as pyridine, to produce crystallites which disperse readily in pyridine, methanol, and aromatics but no longer disperse in aliphatic solvents. Such a surface exchange process can be carried out with any compound capable of coordinating to or bonding with the outer surface of the nanocrystal, including, for example, phosphines, thiols, amines and phosphates. The nanocrystal can be exposed to short chain polymers which exhibit an affinity for the surface and which terminate in a moiety having an affinity for a suspension or dispersion medium. Such affinity improves the stability of the suspension and discourages flocculation of the nanocrystal.

> The compound forming the overlayer can have a reactive group that can react with another compound to bond the nanocrystal to the binder.

Applicants respectfully indicate some of the differences between the two indicated passages. Nowhere does the actual passage use the term "attaches" when referring to the dispersion medium. Instead the passage specifically indicates "polymers which terminate in a moiety having an affinity for a suspension or dispersion medium," an affinity for not an attachment to, while at the same time indicating another embodiment where the compound forming the overlayer can interact with "another compound to bond the nanocrystal to the binder". In that sentence, binder refers to the "another compound" not to dispersion medium or suspension. The use of "another compound" indicates a separate compound from the dispersion medium.

Applicants do not find any paragraph in Bawendi that refers to a "binder" which strongly indicates that Bawendi does not disclose a semiconductor nanocrystal in a binder. Additional evidence of the difference between a dispersion medium and a binder can be found in common dictionary definitions of both. Freedictionary .com and hyperdictionary.com both define a binder (in relevant part) as "something used to bind separate particles together or facilitate adhesion to a surface." Bawendi does not teach or suggest a semiconductor nanocrystal in a binder. Ranson and Britton alone or in combination also do not teach or suggest a semiconductor nanocrystal in a binder.

Finally the Examiner has not provided a motivation for combining the references. The Examiner states that

> there is a teaching to combine . . .since Ranson teaches that a thermographic phosphor is used as a luminescent element for determining the temperature of a surface, Bawendi teaches that a semiconductor nanocrystal in a binder is a fluorescent phosphor . . . and Britton teaches that fluorescent phosphors are known to be thermographic phosphors.

See Advisory Action at page 2. Applicants respectfully disagree. Bawendi does not teach a semiconductor nanocrystal in a binder and does not teach that semiconductor nanocrystals in a binder can be used in temperature measurement. In addition, none of Bawendi, Britton or Ranson suggests or teaches that semiconductor nanocrystals in a binder can be used as

temperature sensors. As a result, there is no motivation to combine the three references as suggested by the Examiner.

The Examiner also asserts that it would have been obvious to use semiconductor nanocrystals in a binder "since these luminescent elements [the thermographic phosphor in Ranson and a semiconductor nanocrystal in a binder] are known alternate types of thermographic phosphors, which are known to be useful in obtaining temperature measurements." See Advisory Action at page 2. Applicants respectfully disagree. None of Britton, Ranson, or Bawendi, singly or in combination, teaches or suggests that semiconductor conductor nanocrystals can be used for temperature measurement.

For at least these reasons, claims 15 and 24 are patentable over Ranson in view of Bawendi and Britton. Applicants respectfully request reconsideration and withdrawal of this rejection.

Independent Claims 32, 43, and 45 and claims that depend therefrom and Dependent claims 34-36

Claims 32, 33 and 37-47 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,075,493 to Wickersheim ("Wickersheim") in view of Bawendi, Britton, and U.S. Patent No. 5,233,020 to Hase *et al.* ("Hase"). See page 2 of the Advisory Action of September 11, 2003. Claims 32, 43 and 45 are independent.

Claims 34-36 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Wickersheim, Bawendi, Britton, Hase, as applied to claims 32, 33, and 37-47 above, and further in view of the prior art disclosed by the Applicants ("Prior Art"). See Advisory Action of September 11, 2003 at page 2. Claims 34-36 depend from independent claim 32.

Similar to the previous discussion of the combination of Ranson, Bawendi and Britton, neither Wickersheim, and Hase (for claims 32, 33, 37-47) nor Wickersheim, Hase and the Prior Art (for claims 34-36) supply the important features missing from Bawendi and Britton. None of Wickersheim, Hase or the Prior Art provides semiconductor nanocrystals in a binder, or that semiconductor nanocrystals can be used for temperature measurement of a surface or as temperature sensors or in temperature sensitive coatings or paints.

As discussed previously, with respect to Ranson, Bawendi, and Britton, again there has been no proper motivation to combine Wickersheim with Bawendi, Britton, Hase and the Prior art provided. The Examiner's conclusion of obviousness appears to rest solely on an impermissible hindsight reconstruction of Applicants' discovery using random pieces of the prior art.

For at least these reasons claims 32, 43 and 45 are patentable over the combinations of Wickersheim, Bawendi, Britton, and Hase and claims 34-36 are patentable over the combinations of these references and the Prior Art. Applicants respectfully request reconsideration and withdrawal of these rejections.

Enclosed is a check for $840 for the Petition for 3 Months Extension of Time fee. Please apply any other charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: 3-5-04

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